

THE CLAIMS

The claims of the application, as amended, are:

1. (Canceled)

2. (Canceled)

3. (Currently Amended) A communication system as claimed in claim 21 2, wherein the torque generating apparatus comprises a first assembly (10, 25) including a generally cylindrical member of magnetically soft material and having a longitudinal axis, a second assembly (2) arranged coaxially within the first assembly and including an electromagnetic winding (4), the first assembly and the second assembly being rotatable relative to each other about the axis, the arrangement being such that relative rotation between the first and second assemblies induces a magnetic field which generates rotational torque between the first and second assemblies.

4. (Previously Amended) A communication system as claimed in claim 3, wherein the first assembly is a rotor assembly (10, 25) of the torque generating apparatus for producing rotational torque and the second assembly (2) is a stator assembly of the torque generating apparatus.

5. (Previously Amended) A communication system as claimed in claim 3, wherein rectification means (31) is provided to convert the electrical output from

the alternator to provide D.C. current to the electromagnetic winding (4) of the torque generating apparatus to generate an electromagnetic braking effect.

6. (Previously Amended) A communication system as claimed in claim 5, wherein the electrical output of the alternator (22, 63, 77, 81) is connected indirectly to the electromagnetic winding (4) of the torque generating apparatus by way of alternator voltage regulation means to create the electromagnetic braking effect.

7. (Previously Amended) A communication system as claimed in claim 6 wherein the alternator voltage regulation means functions to provide a progressive braking effect.

8. (Previously Amended) A communication system as claimed in claim 6 wherein the alternator voltage regulation means functions to effect braking at a predetermined set point.

9. (Currently Amended) A communication system as claimed in claim 21 †, wherein the regulated rotation of the alternator speed produces a substantially constant output voltage signal from the alternator.

10. (Currently Amended) A communication system as claimed in claim 21 †, wherein the regulated rotation of the alternator produces a substantially constant output frequency signal from the alternator.

11. (Canceled)

12. (Currently Amended) A communication system as claimed in claim 21
11 wherein the at least one switch comprises a semiconductor switch.

13. (Currently Amended) A communication system as claimed in claim 21
11 wherein the at least one switch comprises an electromechanical switch.

14. (Currently Amended) A communication system as claimed in claim 21
11, wherein a microprocessor (69) is provided to control the at least one switch.

15. (Currently Amended) A communication system as claimed in claim 21
and including 1, wherein the electrical signal comprises coding means to transmit
data to receiving means at a region outside the geological formation.

16. (Previously Amended) A communication system as claimed in claim
15, wherein the coding means is selected from Amplitude Shift Keying, Frequency
Shift Keying, Pulse Position Modulation and Phase Shift Keying.

17. (Previously Amended) A communication system as claimed in claim
15 wherein the receiving means comprises at least one amplifier.

18. (Previously Amended) A communication system as claimed in claim
15, wherein the receiving means comprises timing means.

19. (Previously Amended) A communication system as claimed in claim 15, wherein the receiving means comprises at least one microprocessor.

20. (Currently Amended) A communication system as claimed in claim 21 4, wherein the communication system comprises at least one transformer (93) such that the impedance of the electrical signal can be altered.

21. (New) A communication system for down hole use and comprising:
a drill collar (101) comprising a first portion (103) and a second portion (105) separated from each other by an electrically insulating material;
an alternator (22, 63, 77, 81), an output of which is electrically connected to each of the first and second portions of the drill collar (101) so as to transmit an electrical signal represented by the output of the alternator into a geological formation being drilled;
switch means (75, 79, 83, 85) for controlling transmission of the electrical signal to the drill collar (101); and
torque generating apparatus (2, 4, 10) which generates torque in response to the electrical output of the alternator and which is mechanically connected to the alternator for transmitting such torque to the alternator for regulating rotation thereof.